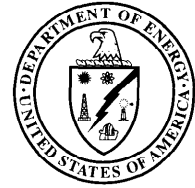


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Idaho Operations Office

Waste Acceptance Criteria for ICDF Landfill (60% Design Component)



Idaho National Engineering and Environmental Laboratory

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November 2001

**Prepared for the
U.S. Department of Energy
Idaho Operations Office**

ABSTRACT

The INEEL CERCLA Disposal Facility landfill will accept Comprehensive Environmental Response, Compensation, and Liability Act wastes generated within the Idaho National Engineering and Environmental Laboratory. Hazardous, mixed, low-level, and Toxic Substance Control Act (polychlorinated byphenyls) wastes will be accepted for disposal at the ICDF landfill. The purpose of this Waste Acceptance Criteria document is to provide the basis for the quantities of radioactive and non-radioactive wastes allowable in waste designated for disposal in the ICDF landfill.

The ICDF Complex Waste Acceptance Criteria is the master Waste Acceptance Criteria. As such, the details of compliance that are the same for all areas of the ICDF Complex are referenced to that document. This ICDF landfill Waste Acceptance Criteria specifies the chemical and radiological waste acceptance criteria for wastes that will be disposed to the landfill. Compliance with the requirements of this ICDF landfill Waste Acceptance Criteria will ensure protection of human health and the environment, including the Snake River Plain Aquifer. Wastes placed in the ICDF landfill must not cause groundwater in the Snake River Plain Aquifer to exceed either maximum contaminant levels a hazard index of 1, or 10^{-4} cumulative risk levels.

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ACRONYMS

ALARA	as low as reasonably achievable
AOC	area of contamination
ARAR	applicable or relevant and appropriate requirement
CAMU	Corrective Action Management Unit
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Central Facilities Area
CFC	chlorofluorocarbons
CFR	Code of Federal Regulations
D&D	decontamination and dismantlement
DOE	U.S. Department of Energy
DOE-ID	Department of Energy Idaho Operations Office
DOT	U.S. Department of Transportation
EDF	Engineering Design File
EPA	Environmental Protection Agency
ER	environmental restoration
HI	hazard index
HOC	halogenated organic compounds
HWD	hazardous waste determination
HWMA	Hazardous Waste Management Act
ICDF	INEEL CERCLA Disposal Facility
IDAPA	Idaho Administrative Procedures Act
IDEQ	Idaho Department of Environmental Quality
IDW	investigation-derived waste
INEEL	Idaho National Engineering and Environmental Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center

LDR	land disposal restriction
MCL	maximum contaminant level
mm	millimeter
O&M	operations and maintenance
NA	not applicable
NCP	National Contingency Plan
OU	operable unit
PCB	polychlorinated biphenyl
PPE	personal protective equipment
RA	remedial action
RAO	remedial action objectives
RCRA	Resource Conservation and Recovery Act
RCT	Radiation Control Technician
RD	remedial design
RD/RA	remedial design/remedial action
RI/FS	remedial investigation/feasibility study
ROD	Record of Decision
SRPA	Snake River Plain Aquifer
SSA	Staging and Storage Annex
SSSTF	Staging, Sizing, Storage, and Treatment Facility
TAN	Test Area North
TCLP	toxicity characteristic leaching procedure
TOC	total organic compounds
TRU	transuranic
TSCA	Toxic Substances Control Act
UTS	universal treatment standards

WAC	Waste Acceptance Criteria
WAG	waste area group
WMP	Waste Management Plan

NOMENCLATURE

The following definitions are presented as an aid to the reader for the understanding of technical and scientific terms used within this document.

Analytical residue and sample preservative residue: Aqueous and organic solutions from sample preservatives and analytical residue generated from field preparation and laboratory analyses.

CERCLA-derived remediation and removal wastes: Wastes from Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) activities that may include, but are not limited to, soil, water, debris, contaminated personal protective equipment (PPE), filters, and other support equipment that cannot be decontaminated.

Construction wastes: Wastes generated during the on-Site construction of CERCLA activities.

Contaminated equipment: Contaminated equipment becomes a waste stream if it cannot be properly decontaminated or reused.

Debris: Solid material exceeding a 60-millimeter (mm) particle size that is a manufactured object, plant or animal matter, or natural geologic material intended for disposal. However, the following materials are not considered to be debris:

- Any material for which a specific treatment standard is provided in Subpart D of 40 Code of Federal Regulations 268, such as lead acid batteries, cadmium batteries, and radioactive lead solids
- Process residuals, such as smelter slag and residues from the treatment of waste, wastewater, sludge, or air emission residues
- Intact containers of hazardous waste that retain at least 75% of their original volume.

A mixture of debris and other material that has not been treated to the standards provided by 40 Code of Federal Regulations 268.45 is subject to regulation as debris, if the mixture is composed primarily of debris, by volume, based on visual inspection.

Drill cuttings: Cuttings generated from well installation activities. Perched water and Snake River Plain Aquifer (SRPA) water well installation is expected to generate a substantial volume of drill cuttings.

Facility: An area within the boundaries of a Department of Energy (DOE)-controlled site that is access-controlled to prevent public access; for example, the Test Reactor Area (TRA), the Idaho Nuclear Technology and Engineering Center (INTEC), and Test Area North (TAN).

Free liquids: Liquids that can readily separated from the solid portion of a waste under ambient temperature and pressure (DOE Order 435.1), as demonstrated by “Environmental Protection Agency Paint Filter Liquids Test Method 9095.”

Hazardous debris: Debris that contains a hazardous waste listed in Subpart D of 40 Code of Federal Regulations 261, or that exhibits a characteristic of hazardous waste identified in Subpart C of 40 Code of Federal Regulations 261.

Hazard index: The sum of more than one hazard quotient where the Environmental Protection Agency (EPA) goal is a value not to exceed 1.

Hazard Quotient: The ratio of a single substance exposure level, over a given time period, to a reference exposure level at which no adverse effects are likely to occur.

Hazardous substances: Any material designated as such pursuant to CERCLA, including all Resource Conservation and Recovery Act (RCRA) hazardous wastes, radionuclides, a variety of other chemical substances, and any material identified as a hazardous substance, such as petroleum, petroleum products, and all hazardous wastes.

Hazardous waste: Waste designated as hazardous by EPA regulations (40 Code of Federal Regulations 261.3) and regulated under RCRA.

High-level waste: Highly radioactive waste material. High-level waste results from the reprocessing of spent nuclear fuel, including the liquid waste produced directly during reprocessing. As per DOE Order 435.1, the term refers to any solid material derived from such liquid waste that contains fission products in sufficient concentrations, and to other highly radioactive material that is determined, consistent with existing law, to require permanent isolation. (Adapted from: Nuclear Waste Policy Act of 1982, as amended.)

Hydraulic spills: Unintentional releases of hydraulic fluid. Spills that occur when hydraulic fluid leaks from equipment seals or through ruptured hoses.

Investigation-derived waste: Materials that are generated from CERCLA investigations, such as drill cuttings, purge water, development water, overburden, interstitial and under burden soils, and wastes (debris, sludge, etc.).

Infectious waste: Waste containing living organisms that could endanger human health or the health of domestic animals or wildlife by extending the range of biological pests, viruses, pathogenic microorganisms, or other agents capable of infesting, infecting, or extensively and permanently altering the normal populations of organisms.

Low-level radioactive waste: Waste that cannot be defined as high-level radioactive waste, spent nuclear fuel, transuranic (TRU) waste, by-product material (as defined in Section 11e. [2] of the Atomic Energy Act of 1954, as amended), or naturally occurring radioactive material (DOE Order 435.1).

Miscellaneous waste: Non-recyclable, unwanted material, such as trash, labels, rags, and other debris.

Mixed waste: Waste containing both radioactive components as defined by the Atomic Energy Act of 1954 (as amended), and hazardous components as defined by 40 Code of Federal Regulations 262.

Personal protective equipment: Items worn or used during waste-handling activities such as coveralls, shoe covers, boots, gloves, glove liners, hoods, and duct tape. Coveralls and hoods are generally made of paper or Tyvek. Gloves are generally latex or nitrile, and glove liners are made of disposable cloth material. Shoe covers and boots are generally rubber.

Purge/development water: Water generated from well development or during sampling that is removed from a well before samples are collected.

Radioactive waste: Solid, liquid, or gaseous material that contains radionuclides regulated under the Atomic Energy Act of 1954 (as amended), which is of negligible economic value considering costs of recovery.

Sample containers. Vessels composed of steel, aluminum, Teflon, brass, glass, or plastic used to contain samples of water, soil, or other media. Once used, these containers become a waste stream if they cannot be decontaminated for reuse.

Secondary waste: A generic category of wastes that are generated from support activities (including operations and maintenance [O&M] activities) related to retrieving, processing, and packaging the investigation-derived materials. Examples of secondary wastes include waste associated with routine decontamination activities (excluding facility closure), PPE, administrative area and support services wastes, used equipment and filters, and other similar wastes generated during O&M activities.

Solidification: A technique that limits the solubility and mobility of hazardous waste constituents through physical means. This process changes the physical state from liquid or semi-solid to a solid.

Soil waste: Soils excavated as part of a project that may be contaminated as a result of spill and pipeline leaks or radioactive liquids from plant liquid transfer operations.

Special case waste: Waste outside the normal operating envelope for the ICDF Complex as defined by the ICDF Complex WACs.

Spent nuclear fuel: Fuel that has been withdrawn from a nuclear reactor following irradiation and that has not yet been reprocessed to remove its constituent elements.

Stabilization: A technique that limits the solubility and mobility of hazardous waste constituents by causing the constituents to bond or chemically react with the stabilizing material.

Structural stability: A waste form that will generally maintain its physical dimensions and its form under the expected disposal conditions, such as weight of overburden and compaction equipment, the presence of moisture and microbial activity, and internal factors such as radiation effects and chemical changes. The waste form itself can provide structural stability by processing the waste to a stable form or by placing the waste in a disposal container or structure that provides stability after disposal.

Toxic Substances Control Act (TSCA) waste: Waste managed strictly under TSCA regulations. Currently, only PCBs and asbestos are regulated under TSCA as waste.

Transuranic waste: Per DOE Order 435.1, radioactive waste containing more than 100 nanocuries (3,700 becquerels) of alpha-emitting TRU isotopes per gram of waste, with half-lives greater than 20 years, except for (1) high-level radioactive waste; (2) waste that the Secretary of Energy has determined, with the concurrence of the administrator of EPA, does not need the degree of isolation required by the 40 Code of Federal Regulations Part 191 disposal regulations; or (3) waste that the Nuclear Regulatory Commission (NRC) has approved for disposal on a case-by-case basis in accordance with 10 Code of Federal Regulations Part 61. (Source: Waste Isolation Pilot Plant Land Withdrawal Act of 1992, as amended.)

Unused and unaltered sample material: Material that may include excess soil cores from the interbeds, underlying basalt, and groundwater.

Void space: *Compressible void space:* Space that is compressible through the application of load or settlement over time (for example, interstitial space in soils, empty space in wooden boxes of soils, etc.). *Incompressible void space:* Percent of voids in waste that is encased in a cement enclosure (for example, void space within a container that has been filled with concrete).

Waste Acceptance Criteria for the ICDF Landfill (60% Design Component)

1. INTRODUCTION

The U.S. Department of Energy, Idaho Operations Office (DOE-ID) authorized a remedial design/remedial action (RD/RA) for the Idaho Nuclear Technology and Engineering Center (INTEC) in accordance with the Waste Area Group (WAG) 3, Operable Unit (OU) 3-13 Record of Decision (ROD) (DOE-ID 1999). The ROD requires the removal and on-Site disposal of some of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) remediation wastes generated within the boundaries of the Idaho National Engineering and Environmental Laboratory (INEEL).

The ROD requirements necessitate the construction of the INEEL CERCLA Disposal Facility (ICDF), which will be the disposal facility for the ROD-identified waste streams. The ICDF will be an on-Site, engineered facility, located south of INTEC and adjacent to the existing percolation ponds, that meets the substantive requirements of Resource Conservation and Recovery Act (RCRA) Subtitle C, Idaho Hazardous Waste Management Act (HWMA), DOE Order 435.1 (DOE 1999a), and Toxic Substances Control Act (TSCA) polychlorinated biphenyl (PCB) landfill design and construction requirements. Designed and authorized to accept not only WAG 3 wastes, but also wastes from other Idaho National Engineering and Environmental Laboratory (INEEL) Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) actions, the ICDF Complex will include the necessary subsystems and support facilities to provide a complete waste disposal system.

The major components of the ICDF include:

- The disposal cells (landfill)
- An evaporation pond comprised of two cells
- The Staging, Sizing, Storage, and Treatment Facility (SSSTF).

The ICDF Complex, including a buffer zone, will cover approximately 40 acres, with a disposal capacity of approximately 510,000 yd³. The evaporation pond, designated as equivalent to a RCRA Corrective Action Management Unit (CAMU) in the OU 3-13 ROD, will be the disposal site for ICDF leachate, and other aqueous wastes generated as a result of operating the ICDF Complex. It will also accept decontamination water and water from CERCLA-generated well purging, sampling, and well development activities. The ICDF leachate will be pumped directly to the evaporation pond and the pump system will track the volume of waste disposed to the pond.

The SSSTF will be designed to provide the centralized receiving, inspection, treatment, and segregation areas necessary to stage and store incoming waste from the other INEEL CERCLA remediation sites prior to disposal to the ICDF landfill or shipment off-Site. All SSSTF activities shall take place within the WAG 3 area of contamination (AOC) to allow flexibility in managing the consolidation and remediation of wastes without triggering land disposal restrictions (LDRs) and other RCRA requirements, in accordance with the OU 3-13 ROD, although LDRs will apply to waste generated outside the WAG 3 AOC or to those wastes that have triggered placement. Figure 1-1 illustrates the WAG 3 AOC (DOE-ID 1999b).

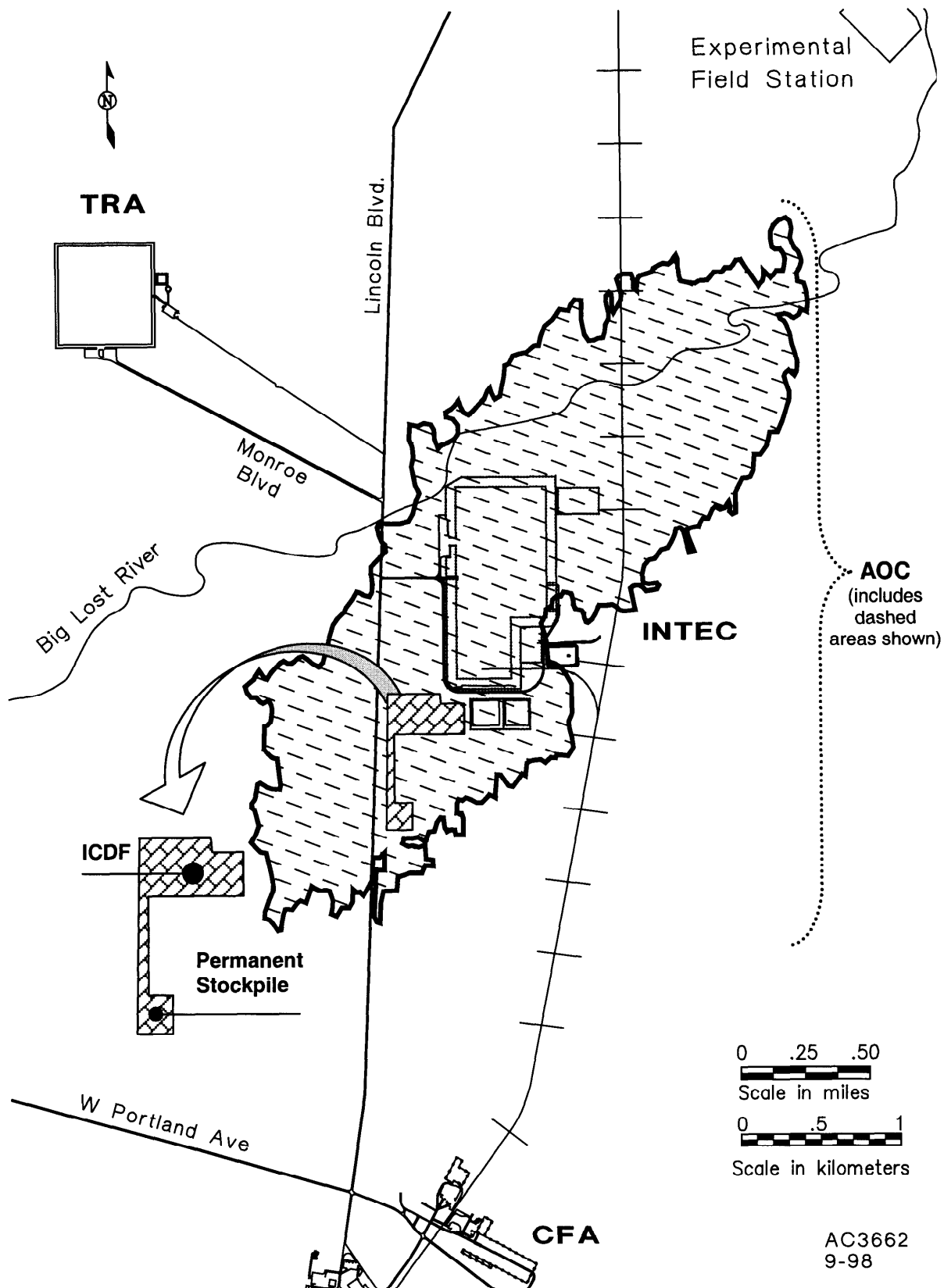


Figure 1-1. WAG 3 area of concern (AOC).

A short-term storage area, the Staging and Storage Area (SSA), is already located within the INTEC fenced area to serve as a temporary storage area for INEEL CERCLA waste designated for:

- Direct disposal to the ICDF landfill
- Packaging in preparation for off-site disposal
- Other INEEL on-site disposal.

Wastes from WAG 3 and other CERCLA remediation sites will be stored at the SSA during the design and construction phases of the ICDF Complex, including the construction of the SSSTF. The SSA will administratively become part of the SSSTF upon agency approval of the SSSTF 90% design (DOE-ID 2001a). The ICDF landfill will accept only low-level, mixed low-level, hazardous, and TSCA PCB wastes generated from INEEL CERCLA activities <500 parts per million (ppm) PCBs for disposal. Current projections of site-wide CERCLA waste volumes total about 510,000 yd³. Most of the waste will be contaminated soil, but debris and CERCLA investigation-derived waste (IDW) are also included in the waste inventory.

This document details the criteria that must be satisfied prior to the ICDF landfill acceptance of waste for disposal. Compliance with the ICDF landfill waste acceptance criteria (WAC) will ensure protection of human health and the environment, including the Snake River Plain Aquifer (SRPA). Wastes placed in the ICDF landfill must not cause groundwater in the SRPA to exceed Idaho maximum contaminant levels (MCLs), 10⁻⁴ cumulative risk levels, or a hazard index (HI) of 1.

1.1 Purpose and Objectives

The purpose of this WAC document is to provide the limits for the quantities of radioactive and non-radioactive constituents that may be accepted for disposal at the ICDF landfill. The objectives of the ICDF landfill WAC are to ensure:

- Waste placed within the ICDF landfill will not exceed the allowable limits for the protection of the SRPA per the OU 3-13 ROD requirements.
- The commitments in the OU 3-13 ROD are met and maintained.
- The waste received at the ICDF landfill contains only the radionuclides and hazardous constituents that the facility can safely manage.
- The concentrations and/or total activities of the waste received at the ICDF landfill are compatible with the ICDF landfill design and operations.
- The low-level waste received at the ICDF landfill is in a form or container that will maintain its integrity and retain acceptable configuration under the conditions expected to be encountered during ICDF Complex operations and closure.
- Waste received at the ICDF landfill does not contain materials that will compromise the safety or integrity of the facility under the expected operating conditions. For example, waste with significant voids could compromise the cover integrity due to subsidence, reactive wastes could compromise worker safety, and liner-incompatible wastes could compromise liner integrity.

1.2 Scope

The ICDF Complex, including the ICDF landfill cells, will be designed to DOE Order 435.1, RCRA Subtitle C minimum technology requirements (40 Code of Federal Regulations [CFR] 264 Subpart K requirements) and TSCA PCB design and construction specifications. The ICDF landfill will be designed and managed to meet the National Contingency Plan (NCP) requirement of maximum 15 mREM/yr exposure to the public. Exposure to members of the public will be evaluated as visitors to the ICDF Complex. The ICDF landfill will be authorized to accept wastes generated within the INEEL from CERCLA removal/remedial and investigative activities at the INEEL WAGs.

1.3 Roadmap to ICDF Landfill WAC

Primary elements of the ICDF landfill WAC that are common to the ICDF Complex WAC are cross-referenced in Table 1-1. Requirements that apply only to the ICDF landfill are included in this ICDF landfill WAC and are not repeated in the ICDF Complex WAC.

Table 1-1. Cross-reference of ICDF complex WAC and ICDF evaporation pond WAC.

Function	ICDF Complex WAC Section
Responsibilities 1.5	1.5
General Requirements of the waste profile process	2.1
Exceptions to WAC requirements (case-by-case acceptance)	2.2.1
General classes of waste	2.2
Waste form requirements	2.2
Composition and waste containers	2.3
Physical and chemical characterization requirements	2.4
Type of acceptable knowledge	2.4.1
Radiological characterization	2.5
Waste acceptance process	3
Waste acceptance scheduling requirements	3.2
Waste tracking system	3.3
Data quality objectives	3.4
Waste profile	3.5
Waste certification process	3.6
Verification as packaged	3.7
Receipt verification	3.8
Non-conforming waste	3.9
Records	3.10
Packaging and shipping	3.11
Prohibitions	5.2
Criticality safety limits	5.4.3
Package external concentration limits	5.4.4
Package dose rate limits	5.4.5

Table 1-1. (continued).

Function	ICDF Complex WAC Section
Packaging criteria	5.5
Outer package criteria	5.5.1
Container requirements	5.5
Condition of containers	5.5.2
Container compatibility and segregation	5.5.3
Securing waste and shielding	5.5.4
Handling packages	5.5.5
Package labeling and marking	5.5.6

1.4 Relationship to Other Documents

This ICDF Landfill WAC is based on and integrated with several related documents, as discussed below.

1.4.1 OU 3-13 Record of Decision

The OU 3-13 ROD (DOE-ID 1999b) is the regulatory authorization for the ICDF Complex. This document includes the regulatory basis for the ICDF landfill, and the applicable or relevant and appropriate requirements (ARARs) that the ICDF Complex must meet. The OU 3-13 ROD also describes the AOC for WAG 3. Because the ICDF Complex will receive waste from both inside and outside of the AOC, this WAC has different requirements for mixed waste from inside and outside of the AOC. These AOC issues are addressed in more detail in the WAC Basis (Section 4).

1.4.2 Related ICDF Complex WACs

When the ICDF Complex becomes operational, three integrated WACs will actively govern the requirements of the acceptance and disposal process. These WACs are briefly described below:

1. **ICDF Complex WAC**—The ICDF Complex WAC will encompass all waste entering the ICDF, including waste for landfill disposal, evaporation pond disposal, or for storage or off-Site shipment. Wastes meeting the ICDF Complex WAC must demonstrate that they meet the ICDF landfill WAC in order to be accepted for disposal in the ICDF landfill, and must meet the Evaporation Pond WAC to be accepted for disposal to the pond. The ICDF Complex WAC contains the WAC components that apply to all wastes, regardless of the intended final disposal.
2. **ICDF Landfill WAC**—This WAC specifies the chemical and radiological requirements for the disposal of waste in the ICDF landfill.
3. **Evaporation Pond WAC**—This WAC specifies the chemical and radiological requirements for disposal of waste in the ICDF evaporation pond. These requirements must be met by all ICDF landfill leachate transferred to the evaporation pond, all monitoring well purge and development water proposed for disposal in the evaporation pond, and other aqueous wastes generated as a result of operating the ICDF Complex.

Integration between the various WACs will be achieved, by use of the ICDF Complex WAC as the master document, and through the use of the same waste profile by all facilities. The waste profile will help provide consistent documentation of the waste during shipment or transfer.

1.5 Responsibilities

Responsibilities for use of the ICDF Complex are described in the ICDF Complex WAC, Section 1.5 (DOE-ID 2001b).

2. WASTE PROFILE PROCESS

The waste profile process is described in Section 2 of the ICDF Complex WAC (DOE-ID 2001b).

2.1 General Requirements

General requirements of the waste profile process are described in Section 2.1 of the ICDF Complex WAC (DOE-ID 2001b).

2.2 General Class of Waste

General classes of waste are described in Section 2.2 of the ICDF Complex WAC (DOE-ID 2001b).

2.3 Composition and Waste Containers

Composition and waste containers are described in Section 2.3 of the ICDF Complex WAC (DOE-ID 2001b).

2.4 Physical and Chemical Characterization

Physical and chemical characterization requirements are described in Section 2.4 of the ICDF Complex WAC (DOE-ID 2001b).

2.5 Radiological Characterization

Radiological characterization requirements are described in Section 2.5 of the ICDF Complex WAC (DOE-ID 2001b).

3. WASTE ACCEPTANCE PROCESS

The waste acceptance process is described in Section 3 of the ICDF Complex WAC (DOE-ID 2001b).

3.1 Waste Flow Through Process

The waste flow through process is described in Section 3.1 of the ICDF Complex WAC (DOE-ID 2001b).

3.2 Waste Acceptance Scheduling Requirements

Waste acceptance scheduling requirements are described in Section 3.2 of the ICDF Complex WAC (DOE-ID 2001b).

3.3 Waste Tracking System

The waste tracking system is described in Section 3.3 of the ICDF Complex WAC (DOE-ID 2001b).

3.4 Data Quality Objectives

Data quality objectives are described in Section 3.4 of the ICDF Complex WAC (DOE-ID 2001b).

3.5 Waste Profile

The waste profile is described in Section 3.5 of the ICDF Complex WAC (DOE-ID 2001b).

3.6 Waste Certification Process

The waste certification process is described in Section 3.6 of the ICDF Complex WAC (DOE-ID 2001b).

3.7 Verification as Packaged

Waste receipt verification is described in Section 3.7 of the ICDF Complex WAC (DOE-ID 2001b).

3.8 Noncompliant Waste

Waste received with noncompliant conditions is described in Section 3.8 of the ICDF Complex WAC (DOE-ID 2001b).

3.9 Records

Records requirements are described in Section 3.9 of the ICDF Complex WAC (DOE-ID 2001b).

3.10 Packaging and Shipping

Waste packaging and shipping requirements are described in Section 3.10 of the ICDF Complex WAC (DOE-ID 2001b).

4. WASTE ACCEPTANCE BASIS

4.1 Criteria Basis

The ICDF landfill is authorized to accept CERCLA waste from INEEL activities consistent with the OU 3-13 ROD. Only CERCLA waste will be accepted for disposal to the ICDF landfill. Inactive treatment, storage, and disposal, RCRA past-practice, and decontamination and dismantlement (D&D) waste may be placed in the ICDF landfill through a CERCLA ROD or CERCLA removal action memorandum issued in accordance with CERCLA and the NCP. Waste that has not been coordinated in accordance with the waste acceptance process defined in Section 3 of the ICDF Complex WAC shall not be accepted at the ICDF landfill.

The basis for acceptance criteria includes protection of human health and the environment, protection of the ICDF landfill liner system, control of waste form, compliance with environmental regulations (ARARs) as authorized by the OU 3-13 ROD, and development of a chemical, radiological, and physical WAC.

4.1.1 Remedial Design Analysis

The WAC is based on the Design Basis Inventory (DOE-ID 2001c) and the results of the studies summarized in Table 4-1.

Table 4-1. Summary of ICDF study results influencing the ICDF WAC.

Document	Summary of results
Permeable Reactive Barrier Evaluation Study (DOE-ID 2001d)	A Permeable Reactive Barrier would not increase protection of human health and the environment over the ICDF design with a low-infiltration cover. The contaminant that indicated a potential to exceed the RAOs was I-129.
Leachate/Contaminant Reduction Time Study (60% Design Component) (Draft) (DOE-ID 2001e)	This study provides the content of a hypothetical ICDF leachate based on the Design Basis Inventory (DOE-ID 2001c). It provides the modeled composition of the leachate during the operations period, taking into account solubility, soil-water partitioning, and radioactive decay, using a combination of K_d s and geochemistry modeling. An operational period of 15 years was assumed for the ICDF landfill.
Fate and Transport Modeling Results Summary Report (60% Design Component) (Draft) (DOE-ID 2001f)	This study estimated contaminant fate and transport (100,000-year simulations) through the vadose zone to a hypothetical monitoring well located 20 meters (m) downgradient of the ICDF landfill in the SRPA. The model was run for infiltration rates varying from 0.01 to 0.00001 m/year.
Waste-Soil Design Ratio Calculations (DOE-ID 2001g)	These calculations were performed for various types of solid debris varying from rubble to cement monoliths. The soil/waste ratio depends on the size and the shape of the non-soil waste and varies from 2:1 to 19:1.
Hydrologic Modeling of Final Cover (60% Design Component) (Draft) (DOE-ID 2001h)	The model was used to evaluate long-term infiltration rates through the landfill cover section for the ICDF landfill. Infiltration onto the cover was varied to account for sequential years of above average precipitation.
Liner/Leachate Compatibility Study (Draft 30%) (DOE-ID 2001i)	This study indicates that the main chemical threat to the ICDF landfill liner would be organic constituents. Organic constituents would have to be present at concentrations several orders of magnitude higher than the Design Basis Inventory (DOE-ID 2001c) organic constituents before they could be considered a problem for liner compatibility.

4.1.2 Protection of Human Health and the Environment

Worker protection shall be provided by compliance with the requirements of the site-specific health and safety program for the ICDF Complex operations (INEEL/EXT-01-00033).

The waste handling at the ICDF landfill shall be consistent with as low as reasonably achievable (ALARA) requirements for maintaining worker exposure, in accordance with DOE Order 5400.5. The primary long-term routes of exposure to hazardous constituents and the radionuclides that are of concern after placement of waste in the ICDF landfill include the ingestion of contaminated groundwater or intrusion into the waste.

4.1.2.1 Remedial Action Objectives. Remedial Action Objectives (RAOs) for the SRPA relating to the ICDF Landfill as stated in the OU 3-13 ROD (DOE-ID 1999, page 8-2) are:

“Maintain caps placed over contaminated soil or debris areas that are contained in place and the closed ICDF-complex, to prevent the release of leachate to underlying groundwater which would result in exceeding a cumulative carcinogenic risk of 1×10^{-4} , a total HI of 1, or applicable State of Idaho groundwater quality standards (for example, MCLs) in the SRPA”

RAOs for the ICDF Complex relating to intrusion (DOE-ID 1999, page 8-3) are:

“Maintain the closed and capped ICDF Complex to prevent exposure to the public to a cumulative carcinogenic risk of 1×10^{-4} and a total HI of 1.”

Development of the WAC for specific radionuclide and chemical constituents, discussed in Section 4.2, was based on evaluation of risk via the groundwater ingestion pathway.

4.1.3 Protection of the ICDF Landfill Liner System

A compatibility study of materials proposed for the ICDF landfill liner system and expected waste leachate was performed as part of the “Liner/Leachate Compatibility Study,” (DOE-ID 2001i). The study concluded that the manufacturer-recommended limits associated with the HDPE geomembrane liners were several orders of magnitude higher than the estimated maximum ICDF landfill leachate concentrations. Based on results of the study, hazardous constituent concentration limits necessary to ensure liner integrity are listed in Engineering Design File (EDF)-Environmental Restoration (ER) 278 (DOE-ID 2001i). The study did not show any threat to the liner from radionuclides present in the waste to be managed at the ICDF landfill. Waste with constituents in sufficient concentration that could result in loss of liner integrity shall not be accepted.

The ICDF landfill management and operations team shall evaluate waste with chemical constituents not listed in this section on a case-by-case basis. The evaluation shall consist of a paper study showing that the new waste constituents are chemically equivalent to an approved constituent. If chemical equivalency cannot be determined through a paper study, EPA Method 9090 (EPA 1986) may be required to show that leachate from the proposed waste is compatible with the liner material. The results of the case-by-case analysis will be documented and retained at the ICDF Complex.

4.1.4 Compliance with ARARs

The ICDF is a part of a CERCLA Remedial Action (RA), and the ARARs are clearly identified in the OU 3-13 ROD. Compliance with these ARARs is documented in the ARARs cross-walk for the

ICDF Complex, which is found in Appendix C of the “INEEL CERCLA Disposal Facility Remedial Design/Remedial Action Work Plan,” (DOE-ID 2001j).

4.2 Development of Numerical Waste Acceptance Criteria

For wastes within the AOC, the WAC for each hazardous constituent and radionuclide was calculated based on the risk Remedial Action Objectives (RAOs) identified in the OU 3-13 ROD, including risk via groundwater ingestion pathway and no exceedence of MCLs. The logic for determining the allowable WAC concentration for each constituent from inside the AOC is shown in Figure 4-1 at the end of this section. The specific numerical WACs are found in Section 5.

4.2.1 Fate and Transport Modeling Results

The contaminant fate and transport modeling effort provides the basis for development of groundwater RAO-based waste soil contaminant concentrations. The groundwater RAOs for this activity are the maximum contaminant concentration (MCL) promulgated under the Safe Drinking Water Act, risk-based concentrations derived from 1×10^{-4} excess cancer risk, and risk-based concentrations derived from a hazard index of 1.0 for non-carcinogens. Results of fate and transport modeling showing groundwater concentrations at the point of compliance, along with RAOs for selected constituents, are shown in Table 4-2. The fate and transport modeling results are included in Appendix A. The constituents listed are those identified as contributing the most to cumulative risk within the time groups determined by the model. Table 4-3 lists constituents for which no transport, decay, or toxicity data were identified in Tier 1 analyses. The RAO-based waste concentrations were developed to support Tier 1 development of the waste acceptance criteria for the ICDF landfill. The use of groundwater RAO-based concentrations provides the basis for ensuring that waste soil disposed to the landfill will not cause exceedences of the RAOs at the down-gradient groundwater compliance point. Although the initial Tier 1 assessment of RAO-based concentrations was focused on the constituents identified in the ICDF design basis inventory, the same concept is applicable to any new contaminant(s) to be considered for disposal at the facility. The Tier 1 effort identified dilution/attenuation factors for site contaminants based on their relative mobility. If the relative mobility (i.e., distribution coefficient [Kd]) is known, along with the environmental half life of the contaminant, a resultant compliance point groundwater concentration for the constituent can be derived for comparison to and RAO-based concentration.

The RAO-based waste soil concentration limits were developed on an individual constituent basis (i.e., the limits are based on single constituents for the risk-based concentrations). Because the inventory of actual waste received into the facility can be controlled administratively, the individual constituent RAO-based limits, can be combined and adjusted to produce a disposed waste stream that exhibits an acceptable overall cumulative risk for the risk-based RAO limits.

With the Tier 1 assessment complete, the Tier 2 assessment will be performed to develop the actual initial facility waste acceptance criteria. The Tier 1 assessment identified design inventory constituents in groups of similar transport characteristics, and subsequently, similar travel times from the landfill to the groundwater compliance point. The first step in the Tier 2 assessment is to combine all of the design inventory contaminants to identify any cumulative risks that may exceed the RAOs based on cumulative migration of both radioactive and non-radioactive constituents. The waste constituents shown in Table 1 were identified as exhibiting simulated compliance point groundwater concentrations in excess of 10% of the RAO-based limits when present in the waste soil at the design basis inventory concentration.

Table 4-2. Results of contaminant transport simulations for selected constituents at maximum design recharge rate of 0.0001 m/yr scaled to ICDF inventory.

Contaminant	Risk Grouping Based on Apparent Travel Time to Peak Concentration in Groundwater at Compliance Point	Compliance Point Peak Concentration – decayed				Risk Group Cumulative Hazard Index for Time Period of Peak Arrival	Risk Group Cumulative Excess Cancer Risk for Time Period of Peak Arrival
		Modeled Groundwater Concentration at Design Inventory Soil Concentration	MCL	1×10^{-4} Risk-based Concentration	Hazard Index = 1 Risk- based Concentration		
H-3 (pCi/L)		2.63E-07	2.00E-04	6.04E+03	NA		
I-129 (pCi/L)		8.63E-01	1.00E+00	2.67E+00	NA		
Tc-99 (pCi/L)		2.02E+00	9.00E+02	5.56E+01	NA		
Fluoride (mg/L)		3.11E-03	4.00E+00	NA	1.63E-02		
RDX (mg/L)		0.00E+00	NA	1.4E-03	1.35E-04		
Cyanide (mg/L)	Group 1 (2,000 to 500,000 years)	2.71E-04	2.00E-01	NA	4.62E-05	1.79E-2 (1/56)	3.85E-6 (10E-4/26)
2-Nitroaniline (mg/L)		2.19E-05	NA	NA	2.58E-06		
3-Nitroaniline (mg/L)		2.19E-05	NA	NA	2.58E-06		
4-Nitroaniline (mg/L)		2.19E-05	NA	NA	2.58E-06		
Boron (mg/L)		7.80E-02	NA	NA	3.07E-04		
U-235 (pCi/L)		2.15E-03	1.50E+01	9.41E-02	NA		
Np-237 (pCi/L)		8.19E-03	1.50E+01	5.38E-02	NA		
Sr-90 (pCi/L)		0.00E+00	8.00E+00	6.51E+00	NA		
Zn-65 (pCi/L)		0.00E+00	3.00E+02	5.10E+01	NA		
Eu-155 (pCi/L)		0.00E+00	6.00E+02	6.27E+01	NA		
Cs-137 (pCi/L)	Group 2 (>500,000 years)	0.00E+00	2.00E+02	2.44E-05	NA	3.23E-02 (1/31)	5.575E-07 (10E-4/74)
Co-60 (pCi/L)		0.00E+00	1.00E+02	2.28E+01	NA		
U-238 (pCi/L)		4.35E-02	1.50E+01	1.02E-01	NA		
Molybdenum (mg/L)		1.79E-04	NA	NA	1.36E-03		
Barium (mg/L)		2.37E-04	2.00E+00	NA	7.76E-06		

NA = Not Applicable

Table 4-3. Summary of design inventory constituents for which no transport, decay, or toxicity data were identified in Tier 1 analysis.

Chemical Name	Nature of Compound	Potential Surrogates
3-Methyl Butanal	Flavoring compound	Not Determined in Tier 1
3,4-Dimethyl Decane	Not Determined in Tier 1	Not Determined in Tier 1
Dimethyl Disulfide	Not Determined in Tier 1	Not Determined in Tier 1
Eicosane	Straight chain hydrocarbon used in cosmetics, lubricants, plastics	Not Determined in Tier 1
Ethyl cyanide	Solvent, chemical intermediate	Not Determined in Tier 1
2,6,10,15-Tetra Heptadecane	Not Determined in Tier 1	Not Determined in Tier 1
2,3,7-Trimethyl Octane	Not Determined in Tier 1	Not Determined in Tier 1
o-Toluenesulfonamide	Plasticizer	Not Determined in Tier 1
p-Toluenesulfonamide	Plasticizer	Not Determined in Tier 1
Tributylphosphate	Metal extractant	Not Determined in Tier 1
4,6-Dimethyl Undecane	Not Determined in Tier 1	Not Determined in Tier 1

Table 4-3 presents design inventory constituents for which no transport, degradation, or exposure basis information were identified during Tier 1 assessment.

The Tier 2 assessment of waste constituents will focus on integrating additional requirements that may modify the RAO-based soil concentration limits. Tier 2 activities will include the following:

- Assess supplemental information for specific waste constituents (e.g., solubility limits based on geochemical nature of waste soil and/or landfill leachate).
- Identify INEEL background concentrations for naturally-occurring elemental constituents (e.g., fluoride, barium, boron).
- Evaluate the quantity of constituents expected to be removed from the landfill system in leachate during the operations and post-closure period.
- Identify comparable surrogate constituents for constituents with no defined transport or degradation characteristics.
- Adjust the preliminary RAO-based concentration limits accordingly based on the effects of solubility and mass removal in leachate. Do not include risk-based limits for naturally-occurring constituents that do not exceed site background concentrations.
- Compile cumulative risk for all waste constituents within travel time periods in which the Tier 1 screened constituents are present (i.e., those constituents that exhibited modeled concentrations greater than 10% of groundwater RAO concentrations).
- Apportion risk among the constituents present in the specific time periods to maximize the allowable waste inventory of constituents expected to be present.

- Use the dilution/attenuation factors and decay factors derived from the fate and transport model to calculate revised RAO-based waste soil concentrations for the waste constituents.
- Compare the revised RAO-based soil concentrations to other criteria:
 - Liner compatibility limits
 - Evaporation pond exposure limits
 - Landfill worker exposure limits
 - Constituent-specific regulatory limits (e.g., PCBs, reactive metals, specific radioactive waste limits)
- Select the most conservative (i.e., lowest) waste soil concentration for each constituent based on the preceding assessments as the waste acceptance criterion for that constituent.

For those few constituents for which no RAO-based waste soil concentration limit can be derived (e.g., some petroleum compounds for which slope factors and/or reference doses and/or MCLs have not been identified) WAC limits may be developed using comparable surrogate compounds. If not surrogates are identified, then treatment or alternative disposal requirements will be developed for waste soil containing those specific constituents.

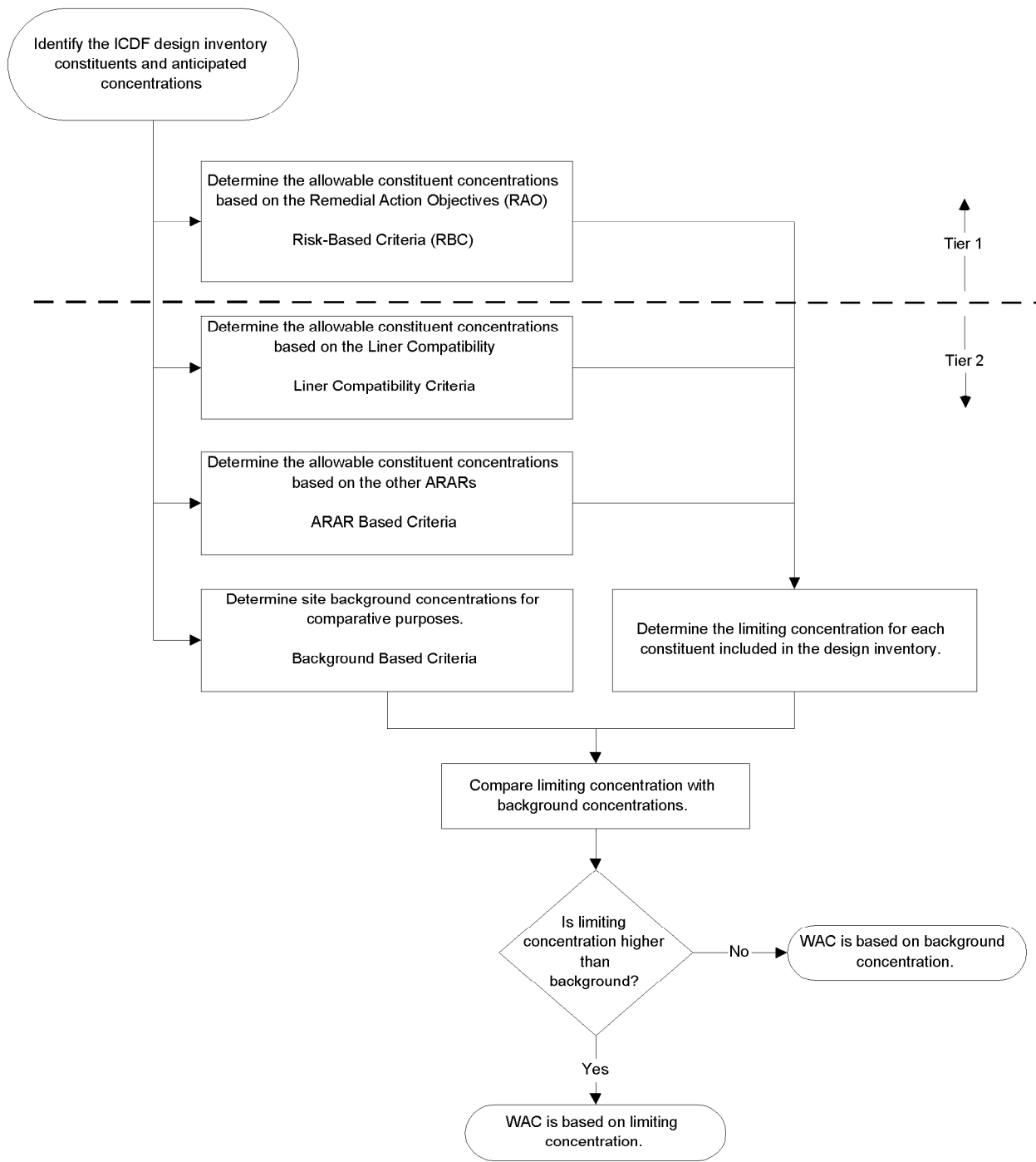


Figure 4-1. Landfill WAC for Tier 1 and Tier 2 Evaluations (60% design).

5. ACCEPTANCE CRITERIA FOR THE ICDF LANDFILL

5.1 Prohibited Waste

The materials prohibited from disposal at the ICDF are described in this section.

5.1.1 Waste With >10 nCi/g Transuranic Constituents

Waste containing greater than 10 nCi/g of TRU radionuclides is prohibited from disposal at the ICDF landfill per the OU 3-13 ROD (Appendix A, OU 3-13 Responsiveness Summary, Responses to comments #28, 226, and 230 [DOE-ID 1999b]).

5.1.2 TSCA Waste Containing > 500 ppm PCBs

TSCA waste containing greater than 500 ppm of PCBs is prohibited from disposal at the ICDF landfill, per 40 CFR 761.60. No waste greater than 500 ppm of PCBs (liquid) is expected, based on the inventory described in “CERCLA Disposal Facility Design Inventory,” (DOE-ID 2001c).

5.1.3 Free Liquids

Wastes containing free liquids are prohibited from disposal at the ICDF landfill, unless the liquids have been stabilized.

5.1.4 Wastes Requiring Treatment

Table 5-1 lists the materials restricted from disposal to the ICDF landfill until specific conditions are met.

Table 5-1. Materials restricted from disposal at the ICDF landfill until the listed conditions have been met.

Restricted Material	Condition to be Met
Bulk disposal of waste containing free liquids	Free liquids must be eliminated by stabilization (adding materials to chemically immobilize the free liquids in the waste). If necessary, the presence of free liquids shall be determined by EPA Method 9095 (“Paint Filter Liquids Test”) (EPA 1986) before shipment to the ICDF Complex (40 CFR 264.314[d]).
Containerized waste holding free liquids, unless one of the following conditions has been met:	All freestanding liquid has been decanted, solidified with nonbiodegradable sorbent materials, stabilized, or otherwise eliminated ^a . The (nonhazardous) waste has been converted into a form that contains as little freestanding and noncorrosive liquid as is reasonably achievable. In no case shall the liquid exceed 1% of the waste volume in a disposal container or 0.5% of the waste volume processed to a stable form ^a .
Refrigerant-bearing equipment containing chlorofluorocarbons (CFCs)	CFC removal has been completed (40 CFR 82).
Pyrophoric waste	Must be treated, prepared, and packaged to be nonflammable prior to being disposed.

Table 5-1. (continued).

Restricted Material	Condition to be Met
Infectious waste, as defined in 10 CFR 61 (including “any substance that may harbor or transmit pathogenic organisms,” which may apply to septic tank sludge)	Must be disinfected.
TNT RDX	Waste not capable of detonation, explosive decomposition, or reaction at normal pressures and temperature, or explosive reaction with water.

a. A procedure for determination of free liquids is provided in the ICDF Complex O&M Manual.

5.1.5 Waste Capable of Detonation, Explosive Decomposition or Reaction

Waste capable of detonation, explosive decomposition, or reaction at normal pressures and temperature, or explosive reaction with water (DOE 1999a) is prohibited. This includes unreacted alkali metal (for example, sodium). Chemicals that react with atmospheric oxygen to form shock-sensitive organic peroxides are prohibited at concentrations that are capable of generating an explosive reaction. The QA program will include a determination that no prohibited wastes are accepted for disposal to the ICDF landfill.

5.1.6 Waste Capable of Generating Toxic Gases, Vapors, or Fumes

Waste capable of generating toxic gases, vapors, or fumes harmful to persons transporting, handling, and disposing the waste (DOE 1999a) are prohibited. The QA program will include a determination that no prohibited wastes are accepted for disposal to the ICDF landfill.

5.1.7 Gaseous Waste

Gaseous waste packaged at a pressure in excess of 1.5 atmospheres at 2°C (6°F) (DOE 1999a) are prohibited. The QA program will include a determination that no prohibited wastes are accepted for disposal to the ICDF landfill.

5.1.8 Waste Exceeding the Class C Limit

Waste exceeding the Class C limit, as defined in 10 CFR 61.55 are prohibited. The QA program will include a determination that no prohibited wastes are accepted for disposal to the ICDF landfill.

5.1.9 Waste Containing Greater than 1% Chelating Compounds by Weight

Waste containing greater than 1% chelating compounds by weight are prohibited. Chelating compounds may mobilize constituents and cause exceedence of the RAOs. The QA program will include a determination that no prohibited wastes are accepted for disposal to the ICDF landfill.

5.1.10 Spent Nuclear Fuel and High-Level Waste

Spent nuclear fuel and high-level waste (DOE 1999a) are prohibited. The QA program will include a determination that no prohibited wastes are accepted for disposal to the ICDF landfill.

5.2 Physical and Chemical Criteria

5.2.1 Liquid and Liquid-Containing Waste

For liquid-containing waste where condensate could form in inner plastic packaging (for example, bags) subsequent to packaging, the condensate shall be eliminated to the maximum extent practical by placing sorbents within the inner plastic packaging. In any case, the amount of liquid may not exceed 1% of the volume of the waste or 0.5% of waste processed to a stable form.

Residual liquids in large debris items shall be sorbed or removed. In cases where removing suspected liquids is not practical and sampling to determine if liquids are present is impossible, the liquids shall be removed to the maximum extent possible by draining suspected liquids at low points and placing an adequate amount of sorbent around each item. In any case, the amount of liquid cannot exceed 1% of the volume of the waste.

5.2.2 Land Disposal Restrictions

The application of LDRs for waste that is either listed waste or characteristic waste depends on whether a waste originates from inside the WAG 3 AOC or has triggered placement.

5.2.2.1 Hazardous Waste. Hazardous waste from outside the WAG 3 AOC, or hazardous waste from inside the WAG 3 AOC that has triggered placement, is prohibited from disposal at the ICDF landfill unless it meets RCRA LDRs of 40 CFR 268, 40 CFR 268.45 (Treatment Standards for Hazardous Debris), or 40 CFR 268.49 (Alternative LDR Standards for Contaminated Soil). Hazardous waste is defined in 40 CFR 261 Subparts C and D of the RCRA. The ICDF landfill cannot accept D-code characteristic waste, F-listed wastes, and most P-code and U-code wastes from outside the AOC or wastes that have triggered placement as defined by RCRA, which are above LDR requirements. Waste characterization will be based on comparison to the toxicity characteristic leaching procedure (TCLP) regulatory levels. If total heavy metals concentrations exceed the TCLP regulatory levels for characteristic waste by the application of the 20X rule, then TCLP analysis will be necessary to determine if the waste is RCRA characteristic. For wastes containing organic constituents that would cause the waste to be characteristic by TCLP, the constituent must be present below the applicable LDR and UST levels for the waste to be accepted into the ICDF. In the case of organic constituents, concentrations below the 20X rule can be used to show a TCLP analysis is not required. For concentrations over 20X, if other information is not available to quantitatively show the waste is not hazardous, a TCLP analysis will be performed.

Wastes not subject to LDRs originating inside the WAG 3 AOC (that has not triggered placement) are acceptable for direct disposal in the ICDF landfill without the need to meet the RCRA LDRs specified in the OU 3-13 ROD (DOE-ID 1999b) provided the waste meets the appropriate WAC.

Table 5-2. ICDF landfill acceptance requirements for organic and inorganic constituents, Tier 1 WAC.

Organic Constituents	Chosen RAO-based Waste Soil Concentration Ci/kg or mg/kg	Source of Chosen Waste Soil Concentration
1,1,1-Trichloroethane	No Limit	NA
1,1,2,2-Tetrachloroethane	No Limit	NA
1,1,2-Trichloroethane	No Limit	NA
1,1-Dichloroethane	No Limit	NA
1,1-Dichloroethene	No Limit	NA
1,2,4-Trichlorobenzene	No Limit	NA
1,2-Dichlorobenzene	No Limit	NA
1,2-Dichloroethane	No Limit	NA
1,2-Dichloroethene (total)	No Limit	NA
1,3-Dichlorobenzene	No Limit	NA
1,4-Dichlorobenzene	No Limit	NA
1,4-Dioxane	No Limit	NA
2,4,5-Trichlorophenol	No Limit	NA
2,4,6-Trichlorophenol	No Limit	NA
2,4-Dichlorophenol	No Limit	NA
2,4-Dimethylphenol	No Limit	NA
2,4-Dinitrophenol	No Limit	NA
2,4-Dinitrotoluene	No Limit	NA
2,6-Dinitrotoluene	No Limit	NA
2-Butanone	3.34E+01	Non-carc RBC
2-Chloronaphthalene	No Limit	NA
2-Chlorophenol	No Limit	NA
2-Hexanone	2.54E+01	Non-carc RBC
2-Methylnaphthalene	1.91E+01	Non-carc RBC
2-Methylphenol	No Limit	NA
2-Nitroaniline	6.08E-03	Non-carc RBC
2-Nitrophenol	No Limit	NA
3,3'-Dichlorobenzidine	No Limit	NA
3-Methyl Butanal	No Limit	NA
3-Nitroaniline	6.08E-03	Non-carc RBC
4,6-Dinitro-2-methylphenol	No Limit	NA
4-Bromophenyl-phenylether	No Limit	NA
4-Chloro-3-methylphenol	No Limit	NA
4-Chloroaniline	2.91E+00	Non-carc RBC
4-Chlorophenyl-phenylether	No Limit	NA
4-Methyl-2-Pentanone	No Limit	NA

Table 5-2. (continued).

Organic Constituents	Chosen RAO-based Waste Soil Concentration Ci/kg or mg/kg	Source of Chosen Waste Soil Concentration
4-Methylphenol	No Limit	NA
4-Nitroaniline	6.08E-03	Non-carc RBC
4-Nitrophenol	No Limit	NA
Acenaphthene	No Limit	NA
Acenaphthylene	No Limit	NA
Acetone	No Limit	NA
Acetonitrile	No Limit	NA
Acrolein	No Limit	NA
Acrylonitrile	No Limit	NA
Anthracene	No Limit	NA
Aramite	6.74E+03	Carc RBC
Aroclor-1016	No Limit	NA
Aroclor-1254	No Limit	NA
Aroclor-1260	No Limit	NA
Aroclor-1268	No Limit	NA
Benzene	No Limit	NA
Benzidine	No Limit	NA
Benzo(a)anthracene	No Limit	NA
Benzo(a)pyrene	No Limit	NA
Benzo(b)fluoranthene	No Limit	NA
Benzo(g,h,i)perylene	No Limit	NA
Benzo(k)fluoranthene	No Limit	NA
Benzoic acid	No Limit	NA
bis(2-Chloroethoxy)methane	No Limit	NA
bis(2-Chloroethyl)ether	No Limit	NA
bis(2-Chloroisopropyl)ether	No Limit	NA
bis(2-Ethylhexyl)phthalate	No Limit	NA
Butane, 1,1,3,4-Tetrachloro-	No Limit	NA
Butylbenzylphthalate	No Limit	NA
Carbazole	1.64E+02	Carc RBC
Carbon Disulfide	No Limit	NA
Chlorobenzene	No Limit	NA
Chloroethane	No Limit	NA
Chloromethane	5.41E+01	Carc RBC
Chrysene	No Limit	NA
Decane, 3,4-Dimethyl	No Limit	NA

Table 5-2. (continued).

Organic Constituents	Chosen RAO-based Waste Soil Concentration Ci/kg or mg/kg	Source of Chosen Waste Soil Concentration
Diacetone alcohol	No Limit	NA
Dibenz(a,h)anthracene	No Limit	NA
Dibenzofuran	No Limit	NA
Diethylphthalate	No Limit	NA
Dimethyl Disulfide	No Limit	NA
Dimethylphthalate	No Limit	NA
Di-n-butylphthalate	No Limit	NA
Di-n-octylphthalate	No Limit	NA
Eicosane	No Limit	NA
Ethyl cyanide	No Limit	NA
Ethylbenzene	No Limit	NA
Famphur	No Limit	NA
Fluoranthene	No Limit	NA
Fluorene	No Limit	NA
Heptadecane, 2,6,10,15-Tetra	No Limit	NA
Hexachlorobenzene	No Limit	NA
Hexachlorobutadiene	No Limit	NA
Hexachlorocyclopentadiene	No Limit	NA
Hexachloroethane	No Limit	NA
Indeno(1,2,3-cd)pyrene	No Limit	NA
Isobutyl alcohol	No Limit	NA
Isophorone	No Limit	NA
Isopropyl Alcohol/2-propanol	No Limit	NA
Kepone	No Limit	NA
Mesityl oxide	No Limit	NA
Methyl Acetate	1.07E+02	Non-carc RBC
Methylene Chloride	No Limit	NA
Naphthalene	No Limit	NA
Nitrobenzene	No Limit	NA
N-Nitroso-di-n-propylamine	No Limit	NA
N-Nitrosodiphenylamine	No Limit	NA
Octane,2,3,7-Trimethyl	No Limit	NA
o-Toluenesulfonamide	No Limit	NA
Pentachlorophenol	No Limit	NA
Phenanthrene	No Limit	NA
Phenol	No Limit	NA

Table 5-2. (continued).

Organic Constituents	Chosen RAO-based Waste Soil Concentration Ci/kg or mg/kg	Source of Chosen Waste Soil Concentration
Phenol,2,6-Bis(1,1-Dimethyl)	No Limit	NA
p-Toluenesulfonamide	No Limit	NA
Pyrene	No Limit	NA
RDX	1.77E+01	Carc RBC
Styrene	No Limit	NA
Tetrachloroethene	No Limit	NA
Toluene	No Limit	NA
Tributylphosphate	No Limit	NA
Trichloroethene	No Limit	NA
Trinitrotoluene	No Limit	NA
Undecane,4,6-Dimethyl-	No Limit	NA
Xylene (ortho)	No Limit	NA
Xylene (total)	No Limit	NA
Inorganic Constituents	Chosen RAO-based Waste Soil Concentration	Source of Chosen Waste Soil Concentration
	Ci/kg or mg/kg	
Aluminum	1.37E+05	MCL
Antimony	2.78E+02	Non-carc RBC
Arsenic	2.55E+00	Carc RBC
Barium	4.80E+04	Non-carc RBC
Beryllium	4.04E+03	Non-carc RBC
Boron	1.09E+02	Non-carc RBC
Cadmium	3.39E+02	Non-carc RBC
Calcium	No Limit	NA
Chloride	3.11E+05	MCL
Chromium	7.57E+04	MCL
Cobalt	4.21E+04	Non-carc RBC
Copper	2.61E+04	Non-carc RBC
Cyanide	2.49E+02	MCL
Dysprosium	No Limit	NA
Fluoride	4.97E+03	MCL
Iron	7.64E+05	Non-carc RBC
Lead	4.12E+04	MCL
Magnesium	No Limit	NA
Manganese	1.64E+04	Non-carc RBC

Table 5-2. (continued).

Organic Constituents	Chosen RAO-based Waste Soil Concentration Ci/kg or mg/kg	Source of Chosen Waste Soil Concentration
Mercury	7.46E+02	Non-carc RBC
Molybdenum	2.64E+02	Non-carc RBC
Nickel	4.88E+04	Non-carc RBC
Nitrate	1.24E+04	MCL
Nitrate/Nitrite-N	1.24E+04	MCL
Nitrite	1.24E+03	MCL
Phosphorus	No Limit	NA
Potassium	No Limit	NA
Selenium	3.51E+03	Non-carc RBC
Silver	1.22E+04	Non-carc RBC
Sodium	No Limit	NA
Strontium	4.21E+05	Non-carc RBC
Sulfate	No Limit	NA
Sulfide	No Limit	NA
Terbium	No Limit	NA
Thallium	1.68E+02	Non-carc RBC
Vanadium	7.96E+00	Non-carc RBC
Ytterbium	No Limit	NA
Zinc	7.64E+05	Non-carc RBC
Zirconium	No Limit	NA

5.2.2.2 Outside of AOC Wastes and AOC Wastes that Have Triggered Placement.

Wastes originating from outside the AOC or that have triggered placement must comply with RCRA ARARs for land disposal. Routinely acceptable wastes (Table 2-1 of the ICDF Complex WAC (DOE-ID 2001b) must meet the LDR restrictions for both listed and characteristic wastes, as found in 40 CFR 268.48. Wastes that have been treated to meet the LDR for characteristic waste must also meet the Universal Treatment Standards (UTS) for underlying hazardous constituents. Determination of whether a waste is listed or characteristic must be performed by the generator and documented on the waste profile.

ICDF Complex users shall determine whether waste is subject to RCRA LDRs by completing a hazardous waste determination (HWD). If the waste is determined to be hazardous, the user will be responsible for evaluating concentrations for the constituents of concern against the applicable treatment standards or prohibition levels. The federal treatment standards and prohibition levels that apply to LDR waste are published in 40 CFR 268.48 and 40 CFR 264.49 (LDR treatment standards for soils) and a limited list of treatment standards is provided in Table 5-3. For waste that is hazardous by characteristic, the underlying hazardous constituents specified in 40 CFR 268.48, UTS that can reasonably be expected to be present at the point of generation of the hazardous waste shall also be evaluated.

Wastes that are soils will be treated to the alternative LDR treatment standards for contaminated soil (40 CFR 268.49).

Waste profile documentation for all hazardous waste shipped to the ICDF Complex shall include information similar to that found in 40 CFR 268.7, including waste code and applicable treatment standard, subcategory, and underlying hazardous constituents. If the treatment standard is expressed in terms of a concentration limit, the actual concentration of the restricted constituent shall also be reported. If the waste has no listed waste codes and no longer exhibits the characteristic of a hazardous waste because it has been treated, the waste certification form shall include a statement describing the treatment technology that was used and the reason the waste is no longer hazardous.

Table 5-3. LDR limits for selected non-soil hazardous wastes.

Waste Code	Waste Description	Regulated Hazardous Constituent	Regulatory Standard (mg/kg total, unless noted otherwise)
D001	Ignitable characteristic waste for high TOC ^a subcategory	NA	Deactivate and meet UTS ^b
D001	High TOC ignitable characteristic waste (>10% TOC)	NA	Prohibited from disposal in ICDF
D002	Corrosive characteristic waste	NA	Deactivate and meet UTS
D003	Reactive waste–water reactive subcategory	NA	Deactivate and meet UTS
D003	Reactive cyanides subcategory	Cyanides (total)	590
		Cyanides (amenable)	30
D004	Wastes that are toxic for arsenic based on TCLP	Arsenic	5.0 mg/L TCLP and meet UTS
D005	Wastes that are toxic for barium based on TCLP	Barium	21 mg/L TCLP and meet UTS
D006	Wastes that are toxic for cadmium based on TCLP	Cadmium	0.11 mg/L TCLP and meets UTS
D007	Wastes that are toxic for chromium based on TCLP	Chromium (Total)	0.60 mg/L TCLP and meet UTS
D008	Wastes that are toxic for lead based on TCLP	Lead	0.75 mg/L TCLP and meet UTS
D008	Radioactive lead solids (for example, lead shielding and elemental lead)	Lead	Macroencapsulation
D009	Wastes that are toxic for mercury based on TCLP and that contain less than 260 mg/kg total mercury	Mercury	0.20 mg/L TCLP and meet UTS
D009	Elemental mercury contaminated with radioactive materials	Mercury	Amalgamation
D010	Wastes that are toxic for selenium based on TCLP	Selenium	5.7 mg/L TCLP and meet UTS
D011	Wastes that are toxic for silver based on TCLP	Silver	0.14 mg/L TCLP and meet UTS
D012	Wastes that are toxic for endrin based on TCLP	Endrin	0.13 and meet UTS
		Endrin aldehyde	

Table 5-3. (continued).

Waste Code	Waste Description	Regulated Hazardous Constituent	Regulatory Standard (mg/kg total, unless noted otherwise)
D013	Wastes that are toxic for lindane based on TCLP	Alpha-BHC Beta-BHC Delta-BHC Gamma-BHC (lindane)	0.066 and meet UTS
D014	Wastes that are toxic for methoxychlor based on TCLP	Methoxychlor	0.18 and meet UTS
D015	Wastes that are toxic for toxaphene based on TCLP	Toxaphene	2.6 and meet UTS
D016	Wastes that are toxic for 2,4-D based on TCLP	2,4-D	10 and meet UTS
D017	Wastes that are toxic for 2,4,5-TP (silvex) based on TCLP	2,4,5-TP (silvex)	7.9 and meet UTS
D018	Wastes that are toxic for benzene based on TCLP	Benzene	10 and meet UTS
D019	Wastes that are toxic for carbon tetrachloride based on TCLP	Carbon tetrachloride	6.0 and meet UTS
D020	Wastes that are toxic for chlordane based on TCLP	Chlordane	0.26 and meet UTS
D021	Wastes that are toxic for chlorobenzene based on TCLP	Chlorobenzene	6.0 and meet UTS
D022	Wastes that are toxic for chloroform based on TCLP	Chloroform	6.0 and meet UTS
D023	Wastes that are toxic for o-cresol based on TCLP	o-Cresol	5.6 and meet UTS
D024	Wastes that are toxic for m-cresol based on TCLP	m-Cresol	5.6 and meet UTS
D025	Wastes that are toxic for p-cresol based on TCLP	p-Cresol	5.6 and meet UTS
D026	Wastes that are toxic for cresols (total) based on TCLP	Cresols	11.2 and meet UTS
D027	Wastes that are toxic for 1,4-dichlorobenzene based on TCLP	1,4-Dichlorobenzene	6.0 and meet UTS
D028	Wastes that are toxic for 1,2-dichloroethane based on TCLP	1,2-Dichloroethane	6.0 and meet UTS
D029	Wastes that are toxic for 1,1-dichloroethylene based on TCLP	1,1-Dichloroethylene	6.0 and meet UTS
D030	Wastes that are toxic for 2,4-dinitrotoluene based on TCLP	2,4-Dinitrotoluene	140 and meet UTS
D031	Wastes that are toxic for heptachlor based on TCLP	Heptachlor Heptachlor epoxide	0.066 and meet UTS

Table 5-3. (continued).

Waste Code	Waste Description	Regulated Hazardous Constituent	Regulatory Standard (mg/kg total, unless noted otherwise)
D032	Wastes that are toxic for hexachlorobenzene based on TCLP	Hexachlorobenzene	10 and meet UTS
D033	Wastes that are toxic for hexachlorobutadiene based on TCLP	Hexachlorobutadiene	5.6 and meet UTS
D034	Wastes that are toxic for hexachloroethane based on TCLP	Hexachloroethane	30 and meet UTS
D035	Wastes that are toxic for methyl ethyl ketone based on TCLP	Methyl ethyl ketone	36 and meet UTS
D036	Wastes that are toxic for nitrobenzene based on TCLP	Nitrobenzene	14 and meet UTS
D037	Wastes that are toxic for pentachlorophenol based on TCLP	Pentachlorophenol	7.4 and meet UTS
D038	Wastes that are toxic for pyradine based on TCLP	Pyradine	16 and meet UTS
D039	Wastes that are toxic for tetrachloroethylene based on TCLP	Tetrachloroethylene	6.0 and meet UTS
D040	Wastes that are toxic for trichloroethylene based on TCLP	Trichloroethylene	6.0 and meet UTS
D041	Wastes that are toxic for 2,4,5-trichlorophenol based on TCLP	2,4,5-Trichlorophenol	7.4 and meet UTS
D042	Wastes that are toxic for 2,4,6-trichlorophenol based on TCLP	2,4,6-Trichlorophenol	7.4 and meet UTS
D043	Wastes that are toxic for vinyl chloride based on TCLP	Vinyl chloride	6.0 and meet UTS
F001, F002, F003, F004, F005	Listed spent solvent wastes	Acetone	160
		Benzene	10
		n-Butyl alcohol	2.6
		Carbon disulfide	(See 40 CFR 268)
		Carbon tetrachloride	6.0
		O-Cresol	5.6
		m-Cresol	5.6
		p-Cresol	5.6
		Cresol mixtures	11.2
		Cyclohexanone	(See 40 CFR 268)
		o-Dichlorobenzene	6.0
		Ethyl acetate	33
		Ethyl benzene	10

Table 5-3. (continued).

Waste Code	Waste Description	Regulated Hazardous Constituent	Regulatory Standard (mg/kg total, unless noted otherwise)
		Ethyl ether	160
		Isobutyl alcohol	170
		Methanol	(See 40 CFR 268)
		Methylene chloride	30
		Methyl ethyl ketone	36
		Methyl isobutyl ketone	33
		Nitrobenzene	14
		Pyridine	16
		Tetrachloro-ethylene	6.0
		Toluene	10
		1,1,1-Trichloroethane	6.0
		1,1,2-Trichloroethane	6.0
		1,1,2-Trichloro-1,2,2-trifluoroethane	30
		Trichloroethylene	6.0
		Trichloromonofluoro methane	30
		Xylenes	30
		Chlorobenzene	6.0

a. TOC (total organic compounds)

b. Universal Treatment Standards

Note: Table represents a partial list of waste codes most likely to be encountered during remediation activities at the INEEL site. 40 CFR 268 (1999) should be consulted to ensure the applicable standard is used.

5.2.3 Solidification or Stabilization of Organic Liquids and Chelating Compounds

Organic liquids and chelating compounds exceeding 1% of the waste by weight must be solidified or stabilized to a form that immobilizes the organic and chelating compounds. Selection and use of solidification and stabilization agents shall be in accordance with the RD/RA Work Plan for the CERCLA action generating the waste.

5.2.4 Asbestos-Containing Waste

Asbestos-containing waste should be sent to the Central Facilities Area (CFA) Bulk landfill unless the radionuclide content of the waste prevents this disposal. If the waste is radioactive, then asbestos-containing waste material shall be packaged in accordance with 40 CFR 61.150. Wetting with water is allowed as long as it does not exceed applicable free liquid requirements. Disposal of asbestos waste will be in accordance with applicable state and federal regulations.

5.2.5 Heat Generation

If heat generation from radiological decay in the waste package exceeds 3.5 watts per cubic meter (0.1 watt per cubic ft), the package must be evaluated using the conversion factors in Appendix B to ensure that the heat does not affect the integrity of the container or surrounding containers in the ICDF landfill. This evaluation must be provided to and approved by the ICDF Complex Operations Manager.

5.2.6 Gas Generation

Gas generation from radiolytic or biological decomposition of containerized waste must be controlled to prevent pressurization exceeding 1.5 atmospheres (152 kilopascals absolute pressure), and combustible gas (for example, hydrogen, methane) concentrations exceeding the lower explosive limit during handling before disposal.

5.2.7 Physical Limits

Physical requirements may influence the disposal of certain waste types to the ICDF landfill, even when the waste satisfies other ICDF landfill WAC. Physical waste characteristics such as weight, volume, dimensions, or length may require adjustment before the waste is accepted for disposal.

Table 5-4 identifies the physical limits and restrictions that must be met before the waste types will be considered for disposal at the ICDF landfill.

Table 5-4. Physical limits for waste proposed for disposal at the ICDF landfill.

Waste Type	Limits and Restrictions
Steel Boxes	Steel boxes are assumed to be completely filled and, therefore, uncompressible. Steel boxes with greater than 5% void space will not be accepted.
Concrete Debris	Concrete may be sent to the ICDF in one of two different forms: <ol style="list-style-type: none"> 1. Reduced to rubble with a maximum dimension of approximately 1 ft. It is preferred that this rubble be mixed with other waste soil so that it can be handled as soil at the ICDF. 2. Large blocks or slabs may be shipped under the following criteria: <ul style="list-style-type: none"> • It must not exceed the gross weight limit for the container • It must not extend above the side walls of the container • It shall not exceed 20 ft in length, and must be loaded toward the rear of the box • All rebar must be cut flush with the surface.
Steel Plate	Steel plate shall not exceed 4 ft in width or 20 ft in length. Steel plate shall not be bent over or folded, so that the waste can be placed and compacted with the same construction equipment used to compact the soil wastes.
Rebar	Rebar should be cut to lengths of approximately 4 ft and mixed with soil to the extent practical. Rebar pieces from D&D projects where soil is not common can be placed in bulk roll-off containers with other hard debris.

5.3 Radiological Criteria

5.3.1 Radiological Concentration Limits

Restrictions on the activity of radionuclides that can be placed in the ICDF landfill were determined in an iterative process that is discussed in Section 4.2. In anticipation that wastes not currently in the inventory will be discovered, the WAC is based on a combination of the total allowable inventory of radionuclides that may impact groundwater, and the protection to worker health and safety. WAC for radionuclides that were not evaluated in development of this WAC will be developed using the same process as was described in Section 4.2 of this document. The radiological concentration (activity limits) given in Table 5-5 were derived from the WAC criteria and logic discussed in Section 4 of this document.

Table 5-5. Radiological concentrations (activity limits for Tier 1 WAC).

Radiological Constituents	Chosen RAO-based Waste Soil Concentration Ci/kg or mg/kg	Source of Chosen Waste Soil Concentration
Ac-225	No Limit	NA
Ac-227	No Limit	NA
Ac-228	No Limit	NA
Ag-106	No Limit	NA
Ag-108	No Limit	NA
Ag-108m	No Limit	NA
Ag-109m	No Limit	NA

Table 5-5. (continued).

Radiological Constituents	Chosen RAO-based Waste Soil Concentration Ci/kg or mg/kg	Source of Chosen Waste Soil Concentration
Ag-110	No Limit	NA
Ag-110m	No Limit	NA
Ag-111	No Limit	NA
Am-241	No Limit	NA
Am-242	No Limit	NA
Am-242m	No Limit	NA
Am-243	No Limit	NA
Am-245	No Limit	NA
Am-246	No Limit	NA
At-217	No Limit	NA
Ba-136m	No Limit	NA
Ba-137m	No Limit	NA
Ba-140	No Limit	NA
Be-10	2.23E-05	Carc RBC
Bi-210	No Limit	NA
Bi-211	No Limit	NA
Bi-212	No Limit	NA
Bi-213	No Limit	NA
Bi-214	No Limit	NA
Bk-249	No Limit	NA
Bk-250	No Limit	NA
C-14	2.61E-05	Carc RBC
Cd-109	No Limit	NA
Cd-113m	No Limit	NA
Cd-115m	No Limit	NA
Ce-141	No Limit	NA
Ce-142	No Limit	NA
Ce-144	No Limit	NA
Cf-249	No Limit	NA
Cf-250	No Limit	NA
Cf-251	No Limit	NA
Cf-252	No Limit	NA
Cm-241	No Limit	NA
Cm-242	No Limit	NA
Cm-243	No Limit	NA
Cm-244	No Limit	NA

Table 5-5. (continued).

Radiological Constituents	Chosen RAO-based Waste Soil Concentration Ci/kg or mg/kg	Source of Chosen Waste Soil Concentration
Cm-245	No Limit	NA
Cm-246	No Limit	NA
Cm-247	No Limit	NA
Cm-248	No Limit	NA
Cm-250	No Limit	NA
Co-57	No Limit	NA
Co-58	No Limit	NA
Co-60	No Limit	NA
Cr-51	No Limit	NA
Cs-132	No Limit	NA
Cs-134	No Limit	NA
Cs-135	No Limit	NA
Cs-136	No Limit	NA
Cs-137	No Limit	NA
Er-169	No Limit	NA
Eu-150	No Limit	NA
Eu-152	No Limit	NA
Eu-154	No Limit	NA
Eu-155	No Limit	NA
Eu-156	No Limit	NA
Fe-59	No Limit	NA
Fr-221	No Limit	NA
Fr-223	No Limit	NA
Gd-152	No Limit	NA
Gd-153	No Limit	NA
H-3	9.00E+02	Carc RBC
Hf-181	No Limit	NA
Ho-166m	No Limit	NA
I-129	1.50E-09	MCL
I-131	No Limit	NA
In-114	No Limit	NA
In-114m	No Limit	NA
In-115	No Limit	NA
In-115m	No Limit	NA
K-40	8.33E-08	Carc RBC
Kr-81	2.08E-08	MCL

Table 5-5. (continued).

Radiological Constituents	Chosen RAO-based Waste Soil Concentration Ci/kg or mg/kg	Source of Chosen Waste Soil Concentration
Kr-85	5.11E+00	MCL
La-138	No Limit	NA
La-140	No Limit	NA
Mn-54	No Limit	NA
Nb-92	No Limit	NA
Nb-93m	No Limit	NA
Nb-94	3.16E+00	Carc RBC
Nb-95	No Limit	NA
Nb-95m	No Limit	NA
Nd-144	No Limit	NA
Nd-147	No Limit	NA
Np-235	No Limit	NA
Np-236	7.79E-06	Carc RBC
Np-237	4.59E-08	Carc RBC
Np-238	No Limit	NA
Np-239	No Limit	NA
Np-240	No Limit	NA
Np-240m	No Limit	NA
Pa-231	No Limit	NA
Pa-233	No Limit	NA
Pa-234	No Limit	NA
Pa-234m	No Limit	NA
Pb-209	No Limit	NA
Pb-210	No Limit	NA
Pb-211	No Limit	NA
Pb-212	No Limit	NA
Pb-214	No Limit	NA
Pd-107	1.22E-04	Carc RBC
Pm-146	No Limit	NA
Pm-147	No Limit	NA
Pm-148	No Limit	NA
Pm-148m	No Limit	NA
Po-210	No Limit	NA
Po-211	No Limit	NA
Po-212	No Limit	NA
Po-213	No Limit	NA

Table 5-5. (continued).

Radiological Constituents	Chosen RAO-based Waste Soil Concentration Ci/kg or mg/kg	Source of Chosen Waste Soil Concentration
Po-214	No Limit	NA
Po-215	No Limit	NA
Po-216	No Limit	NA
Po-218	No Limit	NA
Pr-143	No Limit	NA
Pr-144	No Limit	NA
Pr-144m	No Limit	NA
Pu-236	No Limit	NA
Pu-237	No Limit	NA
Pu-238	No Limit	NA
Pu-239	6.90E-02	Carc RBC
Pu-240	No Limit	NA
Pu-241	No Limit	NA
Pu-242	4.89E-06	Carc RBC
Pu-243	No Limit	NA
Pu-244	7.30E-07	Carc RBC
Pu-246	No Limit	NA
Ra-222	No Limit	NA
Ra-223	No Limit	NA
Ra-224	No Limit	NA
Ra-225	No Limit	NA
Ra-226	No Limit	NA
Ra-228	No Limit	NA
Rb-86	No Limit	NA
Rb-87	5.24E-06	Carc RBC
Rh-102	No Limit	NA
Rh-103m	No Limit	NA
Rh-106	No Limit	NA
Rn-218	No Limit	NA
Rn-219	No Limit	NA
Rn-220	No Limit	NA
Rn-222	No Limit	NA
Ru-103	No Limit	NA
Ru-106	No Limit	NA
Sb-124	No Limit	NA
Sb-125	No Limit	NA

Table 5-5. (continued).

Radiological Constituents	Chosen RAO-based Waste Soil Concentration Ci/kg or mg/kg	Source of Chosen Waste Soil Concentration
Sb-126	No Limit	NA
Sb-126m	No Limit	NA
Sc-46	No Limit	NA
Se-79	5.46E-03	Carc RBC
Sm-146	2.43E-06	Carc RBC
Sm-147	2.65E-06	Carc RBC
Sm-148	No Limit	NA
Sm-149	No Limit	NA
Sm-151	No Limit	NA
Sn-117m	No Limit	NA
Sn-119m	No Limit	NA
Sn-121m	No Limit	NA
Sn-123	No Limit	NA
Sn-125	No Limit	NA
Sn-126	9.52E-04	Carc RBC
Sr-89	No Limit	NA
Sr-90	No Limit	NA
Tb-160	No Limit	NA
Tb-161	No Limit	NA
Tc-98	8.14E-08	Carc RBC
Tc-99	2.51E-07	Carc RBC
Te-123	No Limit	NA
Te-123m	No Limit	NA
Te-125m	No Limit	NA
Te-127	No Limit	NA
Te-127m	No Limit	NA
Te-129	No Limit	NA
Te-129m	No Limit	NA
Th-226	No Limit	NA
Th-227	No Limit	NA
Th-228	No Limit	NA
Th-229	No Limit	NA
Th-230	6.73E-04	Carc RBC
Th-231	No Limit	NA
Th-232	9.82E-07	Carc RBC
Th-234	No Limit	NA

Table 5-5. (continued).

Radiological Constituents	Chosen RAO-based Waste Soil Concentration Ci/kg or mg/kg	Source of Chosen Waste Soil Concentration
Tl-207	No Limit	NA
Tl-208	No Limit	NA
Tl-209	No Limit	NA
Tm-170	No Limit	NA
Tm-171	No Limit	NA
U-230	No Limit	NA
U-232	No Limit	NA
U-233	3.05E-07	Carc RBC
U-234	1.50E-07	Carc RBC
U-235	2.33E-08	Carc RBC
U-236	2.49E-08	Carc RBC
U-237	No Limit	NA
U-238	2.53E-08	Carc RBC
U-240	No Limit	NA
Xe-127	No Limit	NA
Xe-129m	No Limit	NA
Xe-131m	No Limit	NA
Xe-133	No Limit	NA
Y-90	No Limit	NA
Y-91	No Limit	NA
Zn-65	No Limit	NA
Zr-93	No Limit	NA
Zr-95	No Limit	NA
NA= Not available		

5.3.2 Radiological Inventory Limits

The radiological inventory limits for the ICDF landfill will be maintained to stay within the facility safety envelope and authorization basis. These inventory limits are described in the Auditable Safety Analysis (in preparation)

5.3.3 Criticality Safety Limits

Criticality Safety Limits are described in Section 5.4.3 of the ICDF Complex WAC (DOE-ID 2001b), see Table 1-1.

5.3.4 Package External Concentration Limits

Package External Concentration Limits are described in Section 5.4.4 of the ICDF Complex WAC (DOE-ID 2001b), see Table 1-1.

5.3.5 Package Dose Rate Limits

Package Dose Rate Limits are described in Section 5.4.5 of the ICDF Complex WAC (DOE-ID 2001b), see Table 1-1.

5.3.6 Non-Contact-Handled Waste

Non-contact-handled waste shall meet the applicable dose rate restrictions of Department of Transportation (DOT) or an approved packaging safety analysis. Remote-handled waste shall be configured for unloading such that personnel exposures are maintained ALARA.

5.4 Packaging Criteria

Packaging Criteria are described in Section 5.5 of the ICDF Complex WAC (DOE-ID 2001b), see Table 1-1, except as specifically called out in the following sections.

5.4.1 Outer Packages

Criteria for outer packages are described in Section 5.5.1 of the ICDF Complex WAC (DOE-ID 2001b), see Table 1-1.

5.4.2 Condition of Containers

Condition of containers is described in Section 5.5.2 of the ICDF Complex WAC (DOE-ID 2001b), see Table 1-1.

5.4.3 Container Compatibility and Segregation

Container compatibility and segregation are described in Section 5.5.3 of the ICDF Complex WAC (DOE-ID 2001b), see Table 1-1.

5.4.4 Securing Waste and Shielding

Securing waste and shielding are described in Section 5.5.4 of the ICDF Complex WAC (DOE-ID 2001b), see Table 1-1.

5.4.5 Handling Packages

Handling packages is described in Section 5.5.5 of the ICDF Complex WAC (DOE-ID 2001b), see Table 1-1.

5.4.6 Minimizing Subsidence

All waste shall be packaged in a form that minimizes settling and subsidence of the ICDF landfill to the maximum extent feasible. The following forms will be considered to meet these criteria.

- Inherently stable waste that will not subside in the disposal environment
- Waste stabilized by grouting or packaging
- Containerized soil and soil-like solids, sorbed liquids, and waste compacted to a minimum of 20 psi that fills at least 95% of the volume of the container
- Other containerized waste that fills at least 95% of the internal volume of the container; void space should be kept to a minimum
- Any void fillers must be selected and used in accordance with the requirements of this WAC.

5.4.7 Package Labeling and Marking

Package labeling and marking is described in Section 5.5.5 of the ICDF Complex WAC (DOE-ID 2001b).

5.4.8 Vehicle Placarding

Vehicle placarding is described in Section 5.5.7 of the ICDF Complex WAC (DOE-ID 2001b).

5.4.9 Bulk (Noncontainerized) Waste

Labeling of bulk noncontainerized waste is described in Section 5.5.8 of the ICDF Complex WAC (DOE-ID 2001b).

5.4.10 Radiological Contamination Limits

Radiological container limits for waste containers are described in Section 5.5.9 of the ICDF Complex WAC (DOE-ID 2001b).

6. REFERENCES

- 40 CFR 82, 1999, "Protection Of Stratospheric Ozone", *Code of Federal Regulations*, Office of the Federal Register, July 1, 1999.
- 40 CFR 261, 1999, Subpart C, "Characteristics of Hazardous Waste," *Code of Federal Regulations*, Office of the Federal Register, July 1, 1999.
- 40 CFR 261, 1999, Subpart D, "List of Hazardous Waste," *Code of Federal Regulations*, Office of the Federal Register, July 1, 1999.
- 40 CFR 264.314, 1999, "Special requirements for bulk and containerized liquids" *Code of Federal Regulations*, Office of the Federal Register, July 1, 1999.
- 40 CFR 268, 1999, "Land Disposal Restrictions," *Code of Federal Regulations*, Office of the Federal Register, July 1, 1999.
- 40 CFR 268.45, 1999, "Treatment Standards for Hazardous Debris," *Code of Federal Regulations*, Office of the Federal Register, July 1, 1999.
- 40 CFR 268.48, 1999, "Universal Treatment Standards," *Code of Federal Regulations*, Office of the Federal Register, July 1, 1999.
- 40 CFR 268.49, 1999, "Alternative LDR Treatment Standards for Contaminated Soils," *Code of Federal Regulations*, Office of the Federal Register, July 1, 1999.
- 40 CFR 761, 1999, "Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions," *Code of Federal Regulations*, Office of the Federal Register, July 1, 1999.
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